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Investment in Job Training

Why Are SMEs Lagging So Much Behind?

Rita K. Almeida
Reyes Aterido

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Abstract

This paper analyzes the link between firm size and investment in job training by employers. Using a large firm level data set across 99 developing countries, the analysis shows that a strong and positive correlation in investment in job training and firm size is a robust statistical finding both within and across countries with very different institutions and level of development. However, the findings do not support the view that this difference is mostly driven by market imperfections disproportionally affecting small and medium enterprises. Rather, the evidence is supportive of small and medium enterprises having a smaller expected return from the investment in job training than larger firms. Therefore, the findings call for caution when designing pro-small and medium enterprises policies fostering investment in on-the-job training.

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Investment in Job Training:
Why Are SMEs Lagging So Much Behind?[1]

Rita K. Almeida
The World Bank

Reyes Aterido
The World Bank

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1. Motivation

The international community has long recognized the important role of the small and medium enterprise sector (SMEs) in the economies of the developing world. Furthermore, policymakers all over the world worry with how to foster productivity and growth among this group of firms. Moreover, in a modern economy, the investment in human capital is crucial to foster technological adoption and, thus, achieve higher productivity growth. This paper explores a large firm level survey across 99 countries to document the differences in the job training provided by employers across firm size. Our findings show that a strong and positive correlation across the investment in job training and firm size is a robust empirical finding within and across countries with different institutions and income levels. However, our data do not support the view that this difference is fully explained by market imperfections and institutional failures impeding SME development. Rather, they are supportive of SMEs having a smaller expected rate of return from this investment. Finally, our findings call for some caution when designing pro-SME policies tackling these imperfections to effectively remove this investment gap. Policies addressing market imperfections will be most effective when targeting all firms, irrespective of firm size.

The importance of the SME sector throughout the developing world is undeniable. First, SMEs account for more than half of manufacturing employment in many countries (e.g., Ayyagari et al, 2007). Second, there is also a growing recognition of the role that SMEs play in sustained global and regional economic growth, higher employment and poverty alleviation. Moreover, few economists disagree that SMEs face greater constraints to their growth than large firms. Access to finance usually ranks high among these constraints and is often pointed out as the main reason behind SMEs having a smaller capacity to invest. However, there is little systematic research supporting the various policies in support of SMEs primarily because of the lack of data. Nevertheless, documenting and understanding the main binding constraints to firm growth in developing countries is crucial for the design of effective policies that promote long run productivity growth by the private sector.

The investment in human capital has been widely documented as a core component of each individual's human development, firm growth and aggregate

productivity growth (Lucas, 1988). For example, Heckman et al (1998) estimate that individuals invest in human capital over the whole life-cycle, but more than one-half of lifetime human capital is accumulated through post-schooling investments taking place on the job. Moreover, differences in total factor productivity account for approximately half of the differences in income across countries and are generally associated with differences in technological progress (e.g. Hall and Jones, 1999). These differences are also large between firms within a single country (Hsieh and Klenow, 2007) and technology adoption and investment in human capital are shown to be core factors in explaining how firms catch up to the technology frontier, and for designing policies to enhance growth and development. Surprisingly, very little research has been done on the differences across firms in the investment in job training around the developing world and the reason also relates to lack of data.

This paper explores a unique firm level data set across 99 countries in the developing world to (1) document how different are the propensities to invest in job training across firm sizes; and to (2) investigate the reasons behind this differential. In particular, we conjecture that SMEs could be less likely to invest in job training because of three broad sets of reasons. First, the *expected* return on the investment in job training might be smaller for SMEs. This could happen if either SMEs have lower expected benefits or higher marginal costs of the investment in job training. Second, SMEs could be more likely to lack the financial resources to invest, in spite of the possibly large expected returns. Third, in spite of possibly large average returns, SMEs could have worse access to information, face greater uncertainty regarding the returns of this investment or have larger coordination problems with their workers than larger firms.

We explore a large firm level data set, Enterprise Surveys, collected by the World Bank with unique information to study these questions. First, the surveys explore an almost standardized questionnaire across countries, and thus collect information that is comparable across and within countries. Second, the surveys are available for 99 developing countries covering all the geographical regions of the world and income levels. This wide range of countries covered allows us to test the extent to which the existing differentials are explained by differences across countries in their institutions and policies. Third, the surveys collect detailed firm characteristics including variables that

are good proxies for the firm's access to information and external finance, measures of the degree of openness and technological innovation, measures of the human capital composition of the workforce and on the perceptions regarding the investment climate. The availability of several worker and firm characteristics will allow us to analyze the role of different factors in explaining the correlation between the investment in job training and firm size.

Unfortunately, survey limitations also affect the scope of the analysis behind our control. First, in most countries the surveys are representative of the formal sector, and particularly of the manufacturing sector. Since in developing countries the informal sector can reach more than half the workforce, this will naturally limit the representativeness of the analysis to the informal or non-manufacturing sectors. Still, we expect most of the job training taking place in the informal sector to be more of the type of learning-by-doing rather than formal training programs (see Johansen and Van Adams, 2004). Second, the surveys collect only information on formal training programs, leaving undocumented any informal job training taking place while on the job (e.g., learning by doing).[2] Therefore, we will likely underestimate the overall investment in job training, particularly among the smaller enterprises, where informal training is likely to be more important (e.g., Frazer, 2006, Velenchik, 1995, Teal 1996, Monk et al, 2008).[3] Nevertheless, our focus on formal training programs is still economically and policy relevant.

The paper documents several interesting findings. First, we find robust evidence of a large and statistically significant positive correlation between firm size and the investment in job training. In particular, we find that *small* (11-50 permanent employees), *medium* (50-250 employees) and *large* firms (more than 250 employees) train approximately 13, 30 and 40 percentage points more than micro firms (with 10 or less

[2] The job training supplied by the firm does not necessarily take place during the normal working period nor is it necessarily accredited. The *Enterprise Surveys* explicitly refers to "formal programs" in the survey questionnaire does ruling out any form of learning by doing. Since this is employer provided training, we do expect that training benefits both the firm and workers simultaneously. Otherwise, one of them would prevent form engaging in this investment.

[3] In developing countries, training in the formal manufacturing sector takes different forms. First, the technical and vocational training; Second the apprenticeship system, which is mostly informal and has more relevance in Western Africa and; Third, any other formal manufacturing sector training still carried out within firms. In spite of the importance of all these strategies for skills development there is little research in each of these topics. This paper contributes to this literature by focusing on the third channel.

employees). Second, our findings show that these differences are robust across countries in different geographical regions and income levels and, thus, also with different institutional and economic backgrounds. Interestingly our findings show that the disadvantage of micro firms relatively to large firms is greater for firms operating in the Middle East and North Africa and in Africa, as well as for low income countries where training incidence is very low. Moreover, within countries, this pattern is also robust to firms with similar patterns of investment in innovation and technology adoption, operating in the same sector of activity and located in the same city.

Third, we find robust evidence that the differences across firm sizes in the investment in job training are not fully explained by differences across small and large firms in the access to information and external finance, facility in the coordination with workers or in the degree of perceived economic uncertainty. Even though we find that the disadvantage of SMEs in all these factors associated with market imperfections do explain their lower provision of job training across the developing world, quantitatively, they are not the main explanatory factor. This small explanatory power of market imperfections is again a robust finding across geographical regions and countries with different levels of development. We interpret this as suggestive evidence that the SMEs smaller expected returns to the investment in job training play an important role in this under investment. Moreover, differences across firms in the returns of investing in job training seem to be mostly driven by SMEs facing higher expected marginal costs rather than lower expected marginal benefits. Unfortunately, we cannot formally test this assumption due to the lack of data.[4]

It is worth stressing two features of our empirical work. First, we do not directly address the problem of the determinants of the firm size distribution at the country level. Rather we take the distribution of firm size as given within countries and investigate the impact of this predetermined size structure in the investment in job training at the firm level. Nevertheless, our data shows substantial differences in the distribution of firm sizes across countries. And a significant part of these differences are likely to relate with

[4] Unfortunately our data has no information on the direct costs of training and thus we cannot formally show that high marginal costs of investing in job training are an important deterrent for small firms. Almeida and Carneiro (2009) explore data for Portugal during the 80s and find robust evidence of large fixed costs associated with the investment in job training.

differences across countries in institutions like product and factor regulations, or in the fiscal policy (e.g., Kumar et al, 1999).[5] However, in our empirical analysis, we will always *condition* on country and sector heterogeneity and thus only explore within country and sector variation across firm size. Moreover, we will also test the robustness of our findings to when exploring variation within country, sector and city.

Second, even though our main empirical findings survive a battery of tests, we cannot ultimately rule out that the positive correlation between firm size and the investment in job training is driven by a reverse causality argument. In particular, this will be of greater concern if one thinks that the explanatory variable (firm size) is a leading indicator – not a causal indicator – of the firm's investment in job training.[6] However, it is reassuring to see that the differential in the investment across firm sizes is robust to several cuts in our sample as well as to the control of many firm observed characteristics (e.g., managerial education, contract structure within the firm or perceptions of the economic uncertainty) or unobserved country-sector and city variables.[7]

The findings in this paper have important policy implications for the design of policies supporting the investment in job training among SMEs in the developing world. Even though our evidence is supportive of quantitatively important differences across firm sizes, these differences are not primarily explained by variables closely linked with important market imperfections. We argue that the differences in the expected return of

[5] In developing countries, several regulations tend to favor the existence of micro or small firms because they apply only to firms above a certain employment threshold. Kumar et al (1999) explain differences in firm size across countries with the role the institutions such as the judicial and the financial systems.

[6] If the direction of causality runs from the investment in job training to larger firm size, and if the decision to invest in job training is persistent over time, then the positive correlation between firm size at a point in time in the and the investment in job training after that could be due to the fact that the firms investing more in job training subsequently had already larger firm sizes in the previous period. This would thus induce an *ex-post* correlation in the data. We argue that this is a source of small concern because the question posed to firms refers to job training taking place over the last two years, while firm sixe refers only to the previous year.

[7] Unfortunately, for most countries in our sample the *Enterprise Surveys* lack longitudinal information on the investment in job training. Thus we will not be able to account for firm heterogeneity in unobservable factors by exploring time series variation in the investment in job training. Nevertheless, we conjecture that the availability of a short panel of data would not be of much help given the likely persistency in the job training investment. This would naturally limit the explanatory power of exploring changes in the intensity to train (see e.g., Dearden et al, 2005).

investing across firms probably play a more important role. Therefore, simply from an efficiency perspective, a pro-SME intervention in this market is not necessarily needed or desirable. However, the SME investment in job training could be supported for other reasons. First, this investment could create positive externalities on aggregate growth if it leads to higher innovation and technological adoption and, thus, potentially foster market competition. Second, it could also support poverty alleviation if SMEs are more labor intensive than other firms and on the job training fosters growth. To our knowledge there is little empirical evidence supporting both the causal link between SMEs and innovation on the one hand and on the SME's higher labor intensity on the other hand.

Finally, our findings are supportive of policy interventions targeting the access to information and external finance, the facility in coordination between firms and workers and mitigating the perceived uncertainty in the investment climate generating higher incentives to invest across all firm sizes. Moreover, institutional and policy reforms fostering the integration of firms in the global markets and leading to more technological innovations (e.g., through lower regulations on firm entry/exit) will also foster the investment in job training across all firm sizes. The fact that this type of interventions does not overwhelmingly benefit SMEs relatively to larger firms has been supported by others looking at different interventions (e.g., Ibarraran, Maffioli and Stucchi, 2009). Even though improving institutions and the investment climate is an effective way of relaxing some constraints firms face, institution building is a long term process. Meanwhile, improving the access to credit, reducing economic uncertainty or promoting the access to information about training opportunities could yield modest but positive returns.

Our paper relates with two strands of the literature. First we relate to the literature analyzing the patterns and determinants of the investment in job training. In spite of the importance of the topic for both individuals and firms, the systematic empirical evidence based on micro data on on-the-job training in the developing world is still scant. Exceptions include the work by Frazer, 2006, Teal, 1996, Velenchik, 1995, Lopez-Acevedo and Tan, 2003, Rosholm et al, 2007, Pierre and Scarpetta, 2004, Almeida and

Aterido, 2008.[8] Some interesting patterns have been documented at the firm level for developed countries, including the advantage of large firms in this investment (e.g., Black and Lynch, 2001, Lillard and Tan, 1986, Leuven and Oosterbeek, 1999, Royalty, 1996, and Bassanini et al, 2005, for OECD countries). However, to our knowledge, no empirical work to date has documented the robustness of in this difference within and across countries with many institutional and economic differences. Moreover, to our knowledge no other papers to date have analyzed the determinants of these differences in the investment patterns across firm size looking especially at developing countries.

Second, we relate to the empirical literature looking at the growth constraints facing SMEs in the developing world. Some papers analyze the differences between small and large firms in their growth and productivity and on how these relate to differences in the general business environment (e.g., Van Biesebroeck, 2005, Ibarraran, et al, 2009, Aterido, Hallward-Driemeier and Pages, 2011). A particularly large strand of this literature looks at differences across firm sizes in the access to external finance (e.g, Beck, Demirgüç-Kunt and Maksimovic, 2005, Galindo and Micco, 2007). Some papers have also analyzed differences across small and large firms in other performance indicators like the investment in innovation and technological adoption (De Mel, McKenzie and Woodruff, 2009). While it is unquestionable that SMEs play an important role in the developing world, most analysis do not lend foundation for policies supporting SMEs (e.g., through subsidizing SME's investments). However, most of micro analyses have been criticized for being country or region specific. Moreover, to our knowledge no previous work has investigated the empirical determinants of the lower investment by SMEs in job training. We follow Beck et al, (2005) and Ibarraran et al, (2009) and ask whether cross-country evidence provides an empirical basis for pro-SME policies.[9]

[8] Middleton et al (1993) and Johanson and Van Adams (2004) have interesting discussions on the investment in job training around the developing world. However, they resort mostly to anecdotal evidence based on country case studies.

[9] There is a large debate around the benefits and costs of SME based policies. The micro evidence at the country level does not provide much support for the view that SMEs have a greater effect on productivity, employment and growth than large firms. In particular, the bulk of the firm-level evidence does not support the contention that SMEs are particularly effective job creators (Rosenzweig, 1988; Brown et al., 1990, Little, et al., 1987). Furthermore, research also does not universally support the claim that SMEs foster particularly innovation (Pagano and Schivardi, 2003; Pack and Westphal, 1986). Finally, while some firm-level studies find that SMEs intensify competition, there is little direct evidence on the positive effects of

The rest of the paper proceeds as follows. Section 2 briefly describes the data set used. Section 3 discusses alternative reasons why SMEs could be less likely to invest in job training than larger firms. Section 4.1 documents the differences across firm sizes in the intensity to train and section 4.2 analyzes the heterogeneity of these findings across alternative samples within and across countries. Section 5.1 discusses the extent to which training differences across firm sizes could relate to differences in the return of this investment or in the role of different market imperfections impeding SME development. Section 5.2 discusses the empirical evidence supporting each factor. Section 6 concludes and draws policy implications.

2. Data

Our analysis explores a large firm level data set, the *Enterprise Survey*, collected by the World Bank across several developing countries. For each of the 99 countries in our sample, we select the most recent wave of data available. The only exception relates to a few countries where we have included a previous wave to the most recent one to insure a more comprehensive coverage of the relevant variables explored in our analysis. The final data set covers more than 48,000 firms operating in 99 developing countries and surveyed between 2002 and 2007. The *Enterprise Surveys* are one of the best data sets to analyze the employer provided job training across developing countries. First, the surveys collect comparable information for several firm characteristics across all the countries. This comparability allows us to document cross country and within country profiles of firms offering job training. Second, the survey collects information on training intensity at the firm level as well as several other firm and workforce characteristics. These include the firm size and age, human capital composition of the workforce, measures of R&D and technology adoption and firm openness. In addition, there is also detailed information on the firm's geographical location and its sector of activity (2-digit-ISIC classification). Third, the surveys reach a substantial number of countries across all

SME policy on productivity growth. One reason could relate with firm size not being an exogenous determinant of growth so that SME policies could distort firm size and hurt economic efficiency (Kumar, et al., 2001, Caves et al., 1980). Alternatively, policies promoting a sound business environment (through low entry/exit barriers, well defined property rights, and effective contract enforcement) could be more conducive to market competition but the benefits are not only restricted to SMEs.

the regions of the world. Table A1 reports the country and regional coverage of the sample (22% of the sample is in Africa, 20.7% of the sample in East Asia, 17.4% in Eastern Europe, 21% in Latin America, 9% in MENA and 9% in South Asia). This wide coverage allow us to document several cross country correlations between the investment in job training and country level indicators as the country's level of development, institutional quality or general educational attainment. Finally, the surveys have the advantage of collecting information on the training flows. This information is likely to be a more accurate measure of recent job training than in surveys attempting to measure the stock of training at the firm level (see e.g., Bassanini et al, 2005).[10] In sum, the *Enterprise Surveys* are an excellent source of micro data on employer provided training but also of cross country statistics. They are by far one of the most comprehensive sources of comparable firm level data in the developing world (see e.g., Aterido, Hallward-Driemeier and Pages, 2011, Almeida and Fernandes, 2008, Ibarraran et al, 2009). Moreover, even when comparing with data for developed countries (e.g., as in Black and Lynch, 2001, for the US) they have the advantage of having a high response rates on information for job training and have the advantage of not exploring recall information. Moreover, because the data is collected at the firm level, it contains information simultaneously for firm and some worker level characteristics.[11]

We measure training intensity at the firm level by computing a dummy variable that equals one when the firm reports having supplied formal training to their workers. The exact question in the survey is: "*Do you offer formal (beyond "on-the-job") training to your permanent employees?*" On average, 39% of the firms in the sample report offering job training to their employees. However, figure 1 illustrates well the wide

[10] The *Enterprise Surveys* also collect information on the extensive training margin for some countries, including the percentage of skilled and unskilled workers trained at the firm level as well as some information on the training hours. We have also found robust size training premiums for the share of both skilled and unskilled workers (not reported but available on request).

[11] The *Enterprise Surveys* have been used in the study closely related topics by Pierre and Scarpetta (2004), Almeida and Aterido (2008), Almeida and Fernandes (2008), Rosholm et al (2007) or Almeida (2009). A previous version of this survey was also used by Frazer (2006) and Teal (1996) for Ghana and by Kahyarara and Teal (2008) for Tanzania (World Bank Regional Program on Enterprise Development). They have also been extensively used in studying the related topic on how the business environment affects firm growth and performance (e.g., Dollar, Hallward-Driemeier and Megistae, 2005, Aterido, Hallward-Driemeier and Pages, 2011)

dispersion across regions of the world and countries. Firms in Africa and in South Asia are the ones training the least in our sample, while firms in Latin America are among the highest trainers. Table A2 in the appendix defines all the variables used in the paper.

Some firms in the data report missing information on job training. This could raise some concerns regarding some biases on misreporting.[12]

It is worth discussing firms could differ significantly in how they define a formal job training program, across countries, sectors and possibly even firm sizes. While all the training events refer to formal programs supplied by the firm, they are likely to differ in content, organization and financing.[13] For example, even though all programs are provided by the firm, the training is not necessarily financed equally by the firm and their workers. In some firms, workers might be willing to support part of the cost, either directly or indirectly (e.g., through lower wages). The training might also have a more general or firm specific content or it can differ depending on whether it is delivered by the firm itself or by a (private or public) training institute. Nevertheless, independently of

[12] Table A3 in the appendix presents a simple model documenting whether the firms with missing data on the question on whether they provide job training differ systematically from other firms. The findings show that firms with missing data are, on average, smaller, younger and have some share of public ownership. Firms are also located in the capital city and have a more skilled workforce than firms reporting non-missing information on job training. Firms operating in non-manufacturing sectors (like retail or services) are also more likely to report missing data than firms in manufacturing. Even though this could be a source of concern, we have analyzed our main findings assuming two extreme scenarios: first assuming all the missing reporting is associated either with no investments in job training; second, assuming all the missing reporting is associated with investing in job training. Reassuringly, the point estimates in these two scenarios would remain qualitatively and quantitatively very similar to our main results (tables 3 through 5). Under the first scenario de point estimates for the baseline specification (table 3, column 3) would become 14.4, 32.8 and 42.1 for small, medium and large sized firms, while in the second scenario the point estimates would become 15.3, 33.8 and 43.1 percentage points, respectively. Moreover, also reassuringly, there would not be significant differences in the relative importance of the factors discussed throughout sections 4 and 5 in the paper.

[13] Since we explore a firm level survey, we assume this question relates to the acquisition of skills required for work. However, the characteristics of the training supplied by each firm are likely to differ. First, trainings could take place inside or outside the normal working period. Second, it can be formally or informally accredited. Third, it can be offered within or outside the firm. From the precise question asked being asked it is unclear the type of training being offered. However, since the survey covers mostly formal sector firms and the question refers to *formal* training (*"beyond on the job"),* we assume that the survey captures mostly formal training episodes taking place off the working period. This comes in opposition to the informal training, which tends to take place during the working period and usually does not result in a specific qualification. The latter is more difficult to measure. Nevertheless, and independently of the training type, we do expect the training to benefit jointly firms and workers through higher productivity and/or wages. Otherwise, one of the parties would not be willing to engage in it.

these differences, the training provided is likely to be productivity enhancing for both firms and workers. This heterogeneity in the service provided illustrates well the complexity of comparing training incidence across countries. We assume that these differences in training content become less relevant, and eventually vanish, when comparing firms within the same country, city and sector of activity. This will be our main strategy throughout the empirical work.

The final sample covers more than 48,000 firms with non-missing training data across all the regions of the world. Table A1 in the appendix reports the country composition of the final sample. The final sample covers both manufacturing (78%) and non-manufacturing (22%) sectors. Within manufacturing the sample covers: Food and beverages (17%), Chemicals and Plastics (14%), Electronics (8%), Textiles (10%), Garments and Leather (20%), Metals and Machinery (19%), Paper, wood and furniture (10%) and Other (3%). Because the *Enterprise Surveys* cover in a more consistent way the manufacturing sectors across all the countries, in the empirical work that follows we will test the robustness of our main results to the exclusion of this group. This is of particular concern when we compute the correlation between training and productivity due to the well known problems of measuring productivity in non-manufacturing sectors (e.g., Griliches, 1994).

Figure 1 reports training incidence at the country level in our sample. Incidence is captured by the share of firms having provided on-the-job training. The dispersion in this figure is sticking. Developing world is very heterogeneous regarding the job training outcomes. Countries located in South Asia, Middle East and in Africa are among the ones supplying fewer job training. In particular, firms in Pakistan and Senegal report training incidence as low as 11% and 15%, respectively. Rather, firms in Eastern Europe, East Asia and in Latin America report higher training intensities. At least 70% of the firms in Slovakia, Chile and Thailand offer job training programs to their workforce. Nevertheless, one must be cautious when comparing these cross country incidences as they are likely to be affected by measurement error.

Table 1 reports the summary statistics for the main variables used in the paper. On average there are 30% of *micro* firms (up to 10 permanent employees), 37% of *small* firms (between 11 and 50 permanent employees), 22% of *medium* firms (between 50 and

250 permanent employees) and 11% of *large* firms (more than 250 permanent employees). The average firm in the sample is 16.5 years old and has a 51% probability of being located in the capital or in a large city. On average, workers have 7 years of schooling (equivalent to incomplete secondary). In addition, 24.6% of the firms in the sample export, 11.9% have at least 10% of foreign capital and 54% have recently adopted new technology. Finally, most of the firms in the sample are in the manufacturing sector. Among these only 23% of the firms operate in high technology sectors like Electronics, Chemicals and Pharmacy, auto equipment and machinery. The remaining 77% operate in low technology sectors like Textiles, Garments, Agro-industry, wood and furniture, and plastics.

Table 2 reports interesting correlations across firm profiles and training incidence. We divide the sample into training and non-training firms and summarize the main variables of interest. The evidence supports the common view that training firms tend to be larger, more open and older than non-training firms. They also operate in more capital intense sectors, have higher labor productivity and pay higher wages. Furthermore, they have a more skilled workforce and invest more in technology than non-training firms.

3. The Differential in Job Training by Firm Size: Modeling the Determinants

We consider next a simple empirical model to document the size-job training differential. Assume that firm *i* in industry *j* and in country *c* decides whether or not to train its workers if the present value of expected profits from this investment (future benefits minus costs) is positive.

$$Train_{ijc} = \begin{cases} 1 \ if \ \ \pi^*_{ijc} > 0 \\ 0 \ otherwise \end{cases} \qquad (1)$$

Even though we cannot observe the expected profit π^*_{ijc} (latent variable) in our data, we do observe whether the firm offers job training to its employees. We assume that the firm´s profit of investing in job training is linear function of the firm size and of other firm observable characteristics X_{ijc}, its country-sector of activity μ_{cj}: $\pi^*_{ijc} = \beta Size_{ijc} + \delta X_{ijc} + \mu_{cj} + \varepsilon_{ijc}$, where ε_{ijc} captures the firm unobservable characteristics

correlated with the return of investing in job training. Given this latent functional form, the probability that firm *i* offers job training is given by:

$$\Pr(Train_{ijc} = 1) = \Pr(\varepsilon_{ijc} > -\beta Size_{ijc} - \delta X_{ijc} - \mu_{cj}) \qquad (2)$$

Equation (2) can be estimated by maximum likelihood assuming that the error term is normally distributed (probit model). Variable $Size_{ijc}$ includes four firm size dummies: micro (up to 10 employees), small (11-50 employees), medium (51-250 employees) and large (more than 250 employees).[14] In X_{ijc} we include proxy measures for the degree of firm openness (dummy variable when the firm exports more than 10% of total sales or has more than 10% of foreign owned capital), public capital ownership, intensity of technology adoption and for the human capital of the workforce. μ_{cj} are the country and 3-digit ISIC interaction sector dummy variables.[15] Standard errors are clustered at the country and sector level to capture any auto-correlation of the residuals across firms within countries and sectors.

The main coefficients of interest in equation (3) are the β's for each of the size dummies. In the empirical work the omitted category will always be micro firms, therefore the β reports the percentage point difference in the training incidence for small, medium and large firms relatively to micro firms. It is worth highlighting that we always control for country and sector fixed effects. Accounting for country fixed effects is important since countries differ in the strength of their institutions and investment climate, and this is likely to simultaneously influence the incentives of firms in providing on the job training as well as the firm size distribution in the economy. For example, we expect that countries with regulatory institutions favoring larger firms to have a size distribution of firms that is more skewed towards bigger firms, which in turn might offer more training. Furthermore, allowing for country and 3-digit sector fixed effects accounts for differences across firms (within countries) in the capital intensity of their technology

[14] The threshold for firm size dummies are somewhat arbitrary and often differ across countries and studies. Our definition follows Aterido et al (2010) and differentiates small firms from micro firms. It is reassuring to see that our results go through with alternative definitions.

[15] We have a total of 1,089 dummy variables for the 99 countries and eleven three- digit ISIC sectors of activity (including Food and Agro-industry, Textiles, Garments and leather, Metal and Machinery, Electronics, Chemicals and Plastics, Construction, Retailing, Services, Wood, Furniture and Paper and Other industries).

which will also simultaneously affect training intensity and the size distribution in the economy. Therefore, we are confident that our results are not driven simply by the sector composition within countries or to the cross country variation in institutions. Rather with our reduced form, our findings will be driven by comparing differences across firms in the training intensity within the same country and detailed (3-digit ISIC) sector of activity. This decision reflects the fact that both firm size and the intensity to train (as well as the several dimensions of the business environment that we will explore in next section) have substantial variation within countries and sectors. Moreover, controlling for a set of interaction dummies by country and sector also accounts for potential omitted variables and possible measurement errors across countries.

4. **Empirical Findings**

4.1. **Main Results**

Table 3 reports the point estimates for the different variables in equation (2). The specifications across different columns differ in the controls included. In column (1) we just control for firm size and country dummies, in column (2) we add a proxy for the degree of firm openness (dummy variable for whether firm exports and has some foreign owned capital), age of the firm, public ownership and share of skilled workers in the workforce. Column (3) includes in addition to the variables in column (2) a proxy for technological innovation and column (4) includes country-city fixed effects.[16]

The findings in column (1) show that there is a statistically significant and quantitatively important positive correlation between the investment in job training and firm size. In particular, small, medium and large firms are 17.1, 37.8 and 49.8 percentage points more likely to invest in job training than micro firms, respectively. These differences are slightly reduced, although remain quantitatively important and statistically significant, as across columns, we include additional control variables, like firm observable characteristics in columns (2) and (3) and country-city and sector unobservable characteristics, in column (4).

[16] The *Enterprise Surveys* report information on whether the firm is located in the capital city or in cities with more than 1 million workers. The country-city fixed effects include in column (4) of table 3 are the interaction of this city dummy with the country dummies. This specification also controls for sector 3 digit fixed effects.

One reason why larger firms could be more likely to train their workers in column (1) could relate to their larger integration into global markets (both through exports and FDI) or through differences in the shares of capital publically owned, age of the firm, or in the education of the workforce. Moreover, larger firms are also more likely to invest in new technology than smaller firms and this could also lead them to invest more in job training. The findings in columns (2) and (3) of table 3 show that, although the investment in job training is complementary to the skills of the workforce, with the degree of openness and with technological innovation, the magnitude and statistically significance of the job training premium is important after controlling for differences across firms in these characteristics.

Large firms could also systematically differ in their intensity to train due to their geographical location. We conjecture that firms located outside the capital city or in very large cities (with more than 1 million inhabitants) could benefit from more developed institutions or to worse access to information than firms located in larger cities (even within the same country). To the extent that small firms disproportionally locate outside the capital city, as we actually see in our sample, the firm's regional location could be partly driving the differences across small and large firms in their training intensity. The findings in column (4) of table 3 control for these within country differences. Reassuringly, the point estimates in column (4) are almost unchanged from the column (3). Therefore, we will take the specification in column (3) as our baseline specification.

Table A4 in the appendix tests the robustness of the findings reported in table 3 by exploring alternative proxies for the stock of human capital of the workforce and for the degree of innovation and technological adoption. In column (1) we add to the baseline specification reported in column (3) of table 3 the mean years of schooling of the workforce, in column (2) we add to the baseline specification the share of investment in R&D as a share of total sales, in column (3) we add to the baseline specification whether the firm has an International Organization for Standardization (ISO) certification and in column (4) we add over the baseline specification the firm capacity utilization. Reassuringly the point estimates associated with the different firm sizes remain quantitatively similar and statistically significant.

Interesting to discuss are also the signs of the estimates for the control variables in table 3. First, the findings suggest a strong complementarity between the investment in job training of the workforce and the stock of human capital of the workforce, measured by the share of skilled workers in the firm. This finding is supportive of the idea that, the more educated is the workforce in the firm, the higher is the return to this investment, regardless of firm size. This is fully aligned with the empirical evidence exploring household level surveys where more educated workers have higher returns and are more likely to receive job training than less educated workers (see e.g., Tan and Lopez-Acevedo, 2003, Johansen and Van Adams, 2004). Second, the findings also suggest a strong complementarity between the investment in job training and the degree of firm openness, on the one hand and between the investment in job training and technological adoption on the other hand (see e.g. Bee and Batra, 1998).[17] Third, we do not find strong support of the view that all else constant older and publically owned firms are more likely to invest in job training.

Table 4 tests whether the positive correlation across firm size and the investment in job training is driven by other factors related with the firm geographical location and the sector of activity. First, we test whether within each country, the positive correlation across firm size and the investment in job training could be driven by the fact that larger firms disproportionally locate in the country capital or in other very large cities.[18] And, we conjecture that firms located in the capital or in large cities could have better institutions, a better access to information on the quality of trainings or possibly face lower training costs, due to the proximity to training centers. Therefore, larger firms could be, all else constant, more likely to invest in on the job training simply because of their geographical location. Column (1) of table 4 reports the estimates for the baseline specification when restricting the sample only to firms located outside the capital city.

[17] It is also interesting to note that, in column (3) of table 3, the positive correlation between the investment in job training on the one hand and the degree of firm openness on the other hand is not solely explained by differences across firms in their technological innovation. Notice that these point estimates are still large and statistically significant in columns (3) and (4) after controlling for differences across firms in the degree of technological adoption.

[18] In particular, in our sample 40% of the micro and 45% of the small firms are located in the capital or in other very large city, while 50% for the large firms are located there.

Reassuringly the point estimates remain positive and statistically strong than the ones reported in column (3) of table 3.

We investigate next, whether the positive correlation between firm size and the investment in job training could be driven by the sector of activity. This is plausible since small and large firms are likely to differ in the technology use, which in turn is also likely to determine the demand for investing in job training. Even though in the baseline specification reported in column (3) of table 3, we already control for differences across firms in the sector of activity (with country-sector dummies) it is possible that the returns to the investment are different by sector of activity. If the latter holds, we would expect the results to be different across different samples with differing technologies, levels of technological adoption and/or capital/labor rations. Moreover, since in our sample micro and small firms are more concentrated in non-manufacturing sectors, this sector composition could also be driving the results. [19] Column (2) reports the findings for the baseline specification when restricting the sample only to manufacturing firms, which account for 73% of the sample. Reassuringly the magnitude and significance of the point estimates are almost not affected. In columns (3) and (4) we also analyze whether our findings are systematically different across low-tech and high-tech sectors, respectively.[20] In our sample, the low-tech manufacturing sectors have a larger share of smaller firms than the high –tech sectors, probably due to the large fixed costs of starting up high-tech activities. Reassuringly, restricting the sample across these two groups still yields quantitatively large and statistical significant differences in the intensity to train across firm sizes in the two the manufacturing sectors. However, the point estimates in columns (3) and (4) show that the differences across firm sizes are slightly larger for firms operating in the low-tech sectors than for those firms in the high –tech sectors. Finally, one could argue that the differences across firms in the technology used are still not adequately captured by the sector composition of firms. In particular, there is robust

[19] We also worry more with the possible non-representativeness of the *Enterprise Surveys* in the non-manufacturing sectors than for the manufacturing sectors. Moreover, in most countries, the *Enterprise Surveys* do not cover so exhaustively the non-manufacturing sectors.

[20] We follow Parisi et al (2006) and consider high technology manufacturing sectors the following 3-digit ISIC sectors: Auto or Auto-component, Chemical and Pharmaceutical, Electronics or Metals and Machinery industries. The low technology manufacturing sectors are the Beverages, Food, Garment and Leather, Non-metallic/Plastic Materials, Wood and Paper, Textiles.

evidence that there is wide dispersion in productivity even within narrowly defined sectors (e.g., Eslava et al. 2004; Foster, Haltiwanger; and Syverson, 2008), so that the returns to the investment in job training could be more directly related to the stock of physical capital. We test the robustness of our baseline specification to controlling for differences across firms in the capital intensity of their technology (captured by the capital labor ratio). The findings, reported in column (5) of table A4 again show that the main coefficients of interest remain robust.[21] Also interestingly, our findings do not differ significantly if we were to break the sample by the age cohort of firms (not reported but available upon request). The latter is suggestive that the differences across small and large firms in the intensity to train are also not explained by the fact that larger firms tend to be on average older.

4.2. **Heterogeneity around the Developing World**

In this section we discuss whether the positive correlation across firm size and the investment in job training holds across different geographical regions of the world and income levels. We discussed in section 2 that there is a large heterogeneity in the intensity to provide job training across countries and regions of the world. Table A1 in the appendix shows that firms operating in Africa or in South Asia have a lower share of firms offering job training than firms located elsewhere. In particular, a firm in Thailand or in Brazil is, on average, more than four times more likely to offer job training than a firm in Mozambique or in Gambia. Table 3 showed that some of this variation is explained by differences in the observable characteristics of firms across countries. However, there is still a large unexplained variation related with the firm's geographical location.[22]

Table 5 reports the baseline specification when restricting the sample to firms operating in Africa in column (1), in East Asia in column (2), in Eastern Central Europe

[21] The robustness of our results reported in table A4 in the appendix is reassuring but some of the specifications have significantly less observations than our baseline specification because some measures have not been consistently collected across all countries.

[22] Running a regression of training intensity in firm size, not accounting for country fixed effects, yields an R-squared of 0.09 and larger point estimates than the ones reported in column (1) of table 3. In particular we find that small, medium and large firms are 17.3, 38.3 and 48.4 percentage points more likely to train than micro firms. Thus, differences across firms in their geographical location explain approximately half of the observed variation in training intensity across firm size.

in column (3), in Latin America in column (4), in Middle East and North Africa in column (5) and in South Asia in column (6). Firms operating within each of these broad regions of the world have arguably a more similar institutional environment, including the cultural and socio-economic characteristics. In particular, we are interested in understanding how the results could be driven by the specific training policy for the manufacturing sector in Africa. The importance of the apprenticeships particularly in West Africa has been well documented and is predominant among smaller firms (see e.g. Frazer, 2006, Bas, 1989 or Velenchik, 1985).[23] Even though we believe that this type of more informal training schemes is outside the scope of our data, it is important to test the extent to which results could be driven by these institutional differences across regions.[24] Again, our point estimates show quantitatively important differences across all regions of the world. Two facts are worth highlighting, though. First, differences in the intensity to train for Africa and in the Middle East and North Africa (MENA henceforth) are slightly larger than those in our baseline specification. In particular, larger firms are 47 percentage points and 45.8 percentage points more likely to train than micro firms (omitted category) in Africa and MENA. These are regions were training intensity is, according to our sample, one of the lowest in the world. Second, East Asia is the region of the world with smaller dispersion across firm sizes. There small, medium and large firms are 6.8, 23.6 and 32.1 percentage points more likely to train than micro firms, respectively.

Finally, table 6 analyzes the heterogeneity of the main findings by the country's income level. Column (1) reports the baseline specification for firms operating in low income countries, column (2) for firms in middle-low and column (3) in middle-high income countries. [25] Interestingly, the point estimates still show statistically significant

[23] Frazer (2006) describes that apprenticeships are periods of approximately three years during which an apprentice learns a trade. At the end of this period, the apprentice may be hired by the firm where the apprenticeship took place, or start a job elsewhere (including self-employment). Apprenticeships occur most often, but not exclusively, in smaller firms, and the master is often the owner of the firm.

[24] Apprentenships are often criticized for offering informal training methods and lacking theoretical foundations that are needed in the complex technical demands of the formal sector. The main advantages are that it is not government funded (with cost being borne by the apprentice and/or firm) and that they provide an option for youth who would otherwise be unemployed.

[25] The group of middle-high income countries include: Botswana, Chile, Costa Rica, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lebanon, Lithuania, Malaysia, Mauritius, Oman, Poland, Russia, Slovakia and South Africa.

and quantitatively important differences in the intensity to train by firm size, across all income levels. However, when comparing the results to the baseline specification reported in table 3 for all income groups, we find that the dispersion in training associated with larger firms is greater for low income countries, and the one associated with for small and medium sized firms is greater for middle-high income countries.

Our findings in tables 3, 4 and 5 show that large firms provide less on-the-job training than smaller firms around the developing world and that quantitatively the differences are important. The findings also show that these differences in training intensity across firm sizes are not fully explained by differences across firms in their average human capital of the workforce, the degree of firm openness and technological adoption. Moreover, they are also prevalent across all regions of the world and income levels, although differences tend to be larger for firms operating in low-tech sectors, in regions with overall lower incidences and in low income countries.

One point is still worth highlighting. Even though we estimate a strong and positive differential in the intensity to train across firm sizes, we will not be able to ultimately disentangle correlation from causality. In particular, it is possible that the positive coefficients are driven by reverse causality where firm size is a leading indicator – not a causal indicator – of the firm's investment in job training. We argue that the precise question in the survey is likely to mitigate this problem as it recalls information on training incidence over the last two years while the information on firm size refers only to the previous year. Furthermore, it is reassuring to see that the differential in the investment in job training across firm sizes is robust to several cuts in our sample, as well as to the control of several observable and unobservable characteristics, like the degree of firm openness and technological adoption, the skills of the workforce or country-sector unobservable characteristics. Nevertheless, most likely the investment in job training will be linked to higher firm productivity and possibly also with more employment. One way to mitigate this problem is to control for the initial firm size, hoping that employment growth is more likely to be a more exogenous variable. Unfortunately we do not have a good reason to justify this nor is this information available in our data set.

5. Why Do SMEs Invest Less in Job Training?

5.1. Reasons behind Differences

The relevant policy question is thus, what prevents SMEs from engaging in this investment and how could policies be better designed to foster this investment. In some countries, the *Enterprise Surveys* collected some additional information on the main reasons why firms do not offer job training.[26] Unfortunately, this information is collected for a much smaller set of countries and is subjective (self-reported) which prevents us from using it in our empirical analysis. Figures 2 through 5 report this information for Brazil, China and a set of Central American countries, respectively. The three most important reasons for not offering job training relate to managers thinking that informal training (e.g., through learning by doing) is enough investment to foster productivity, the possibility to hire trained workers from other firms (or the poaching of workers) and the lack of financing opportunities. Nevertheless, these factors are the most important irrespective of firm size. This anecdotal evidence also shows that small firms are more likely to report the poaching of workers/labor turnover, the lack of knowledge or the skepticism about training effectiveness and lack of access to finance than larger firms. Lack of financing comes up as a more important reason not to offer job training for smaller firms than in larger firms in Central America and in Sri Lanka. Also, larger firms are less likely to report lack of knowledge or no need for offering job training than smaller firms.

Even though this evidence is interesting, it is subjective and self reported by those firms not engaging in job training, thus making it difficult to explore as a reliable source of information on the different types of market failures facing all firms. In this section, we will explore the richness in our data set to obtain measurable proxies of the market imperfections impeding this investment. We consider the role of alternative factors discussed above and related with the firm's access to information, the access to firm

[26] The exact question posed is differs slightly across countries and for countries in Central America is: "If your plant does not to offer formal training (neither internal or external), please indicate the three principal reasons for not doing so?" (1) New workers become proficient in the job through learning by doing; (2) In-house training is considered adequate; (3) Lack knowledge about training techniques and training programs; (4) Training is not affordable due to my firm's limited resources; (5) Skilled workers can be readily hired from other firms; (6) Skills that workers learn in school are adequate to our needs; (7) Skeptical about the benefits of training and (8) Training is costly because of high labor turnover. Based on this set of options, we have created a dummy variables.

external finance or the perceived uncertainty in the returns. The empirical work in this section will try to isolate the importance of each of these factors.

First, SMEs could be less likely to provide on the job training if the expected rate of return is smaller for SMEs than for larger firms (and this return is, in turn, below the return on alternative investments like the investment in physical capital). One could conjecture different reasons why this could happen. On the one hand, SMEs could face a lower return because the expected benefits of this investment (ultimately translating into higher productivity) are smaller for SMEs than for larger firms. The higher returns for SMEs could relate to the complementarity of the investment in job training with stock if human capital of the workforce, which could be higher (or less heterogeneous) among larger firms. To the extent that the workforce in small firms is on average less educated, or has a more heterogeneous human capital composition than the workforce in large firms, the lower investment could simply be driven by the lack of complementary inputs. The same argument could be done regarding the complementarity of the investment in job training on the one hand and the investment in new technologies or in R&D, on the other. To the extent that these activities are less common among small firms than in large firms (as documented by Almeida and Fernandes, 2008 and De Mel et al, 2009) this would also lead to a smaller investment in job training among smaller firms.

Alternatively, one could conjecture that the expected return of the investment is smaller among SMEs because smaller firms have, on average, a smaller time horizon to recover this investment than larger firms. This could happen if on average labor turnover is higher among SMEs due to their contractual arrangements. Finally, the returns to the investment in job training could be smaller in small firms if there are large fixed costs of training. In this case the marginal cost of investing in job training will be smaller in larger firms leading to a higher expected marginal return of this investment.[27] Almeida and Carneiro (2009) argue that the foregone productivity cost of training accounts for only

[27] The total marginal cost of the investment in job training is a function of the direct cost of training and on the foregone productivity cost of training. There are few data sets with information on the direct costs of training (e.g., training materials). Almeida and Carneiro (2009) are one exception. They find that this is a more important component of the total marginal costs than the foregone productivity (which they proxy by the marginal product of worker's time).

25% of the total costs of training and that the direct costs of training (related to the set up costs of acquiring training materials or hiring training faculty) are a more important component of total costs. Unfortunately, there is little empirical evidence on the magnitude of the training costs both for developed and developing countries mostly due to the lack of data (Machin and Vignoles, 2001).

Second, smaller firms could be less likely to invest in job training if they lack the needed financial resources to invest, in spite of the possibly large expected returns. This could happen if small firms are less profitable or more credit constrained than larger firms. There is a large literature on differences across firms in access to external finance. For example, Beck et al, (2005) show that smaller firms finance a lower proportion of their overall investment externally, because they make smaller use of external bank finance. They also find that in countries with better property rights, small firms disproportionally resort more to more external finance. These results underline the importance of improving the institutional environment for increasing the access of small firms to external finance.[28]

Finally, SMEs might face larger informational asymmetries and more uncertainty regarding the returns of the investment, in spite of possibly large *ex-post* returns. These problems could arise if small firms have less access to information than larger firms due, for example, to the lower human capital/experience of their management or due to a more remote location (where information flows less fluently). Moreover, SMEs could disproportionally face more uncertainty on the quality (or availability) of the investment in job training than large firms. For example, if in countries with a larger SME sector there is also more economic uncertainty or lower quality of institutions, it will be more difficult for firms to access the return of the invest in human capital. This could yield a negative correlation between firm size and the investment in human capital. Finally, SMEs could also face larger coordination problems across firms and workers (see e.g., Pischke, 2005) making it more difficult to invest in job training. Since the benefits of training need to be shared between firms and workers, if there are coordination problems,

[28] They also find that informal financing does little to relax financial constraints faced by small firms in developing economies. Moreover, small firms do not use disproportionately use more leasing or trade finance compared to larger firms.

each party individually might only see part of the total benefit of training. And investment decisions could be less coordinated among SMEs. Alternatively this could also be due to the "poaching externality" (Stevens, 1994).

5.2. Empirical Evidence

We investigate next the extent to which the lower intensity to train among SMEs could be driven by each of the reasons discussed above. In particular we take proxies in our data set to measure the extent to which firms differ in the magnitude of the returns to the investment or if there is any evidence of market failures related with lack of information, difficulties in coordination, restricted access to finance or economic uncertainty. The findings are reported in columns (1) through (7) of table 7. For ease in comparing, we replicate our baseline specification (in column (3) of table 3) in column (1) of table 7.

First we conjecture that SMEs could have a reduced access to information on available training programs and their quality than larger firms. This could be driven by SMEs having a more remote location relatively to the city center than larger firms or due to lower human capital of their management. Reassuringly, our findings are robust to controlling for within country differences in firm location (as discussed in column (4) of table 3). Moreover, the magnitude of the point estimates remains very close even after excluding from our sample those firms in the capital city, with arguable better access to information (in column (1) of table 4). Furthermore, we also assume that the level of education of the manager is much correlated with the set of information available to the firm and test the robustness of the results to controlling for differences across firms in managerial education. In column (2) of table 7 we report the results of estimating the baseline specification (in column 3 of table 3) augmented with a dummy variable that equals one when the manager has received tertiary education. Although smaller, the point estimates are still quantitatively important and statistically significant.[29]

Second, we investigate whether the differences in training intensity could be driven by differences across firms in how easy is the coordination of this investment with

[29] The smaller point estimates are in part also explained by the lack of data on the managers' education for several countries. Replicating our baseline specification in column (1) but for the sample of countries in column (2) would yield coefficients for small, medium and large firms of 10.3, 30.6 and 38.3, respectively.

their workers or in the time during which firms can on average recover this investment in the human capital of their workers. In column (3), we proxy the flexibility in the firm's contractual arrangements with the share of the workforce with temporary contracts. In column (4), we proxy the difficulties in coordination between workers and firms with the share of the workforce that is unionized. The sign of the point estimates on temporary contracts is not clear cut, though. On the one hand, firms resorting more to the use of temporary contracts could have a lower incentive to invest in job training if employers face a smaller horizon to recover this investment. On the other hand, temporary contracts could serve as a stepping stone to hire workers into permanent contracts. Therefore, employers might take the period of the temporary contract to train workers and thus be able to screen their worker's performance and unveil their quality while performing on the job. Empirical evidence exploring individual level data has been found on both directions (see e.g., Arulampalam and Booth, 1998, or Autor, 2004).[30] Our findings in columns (3) and (4) of table 7 show that the positive correlation in training intensity and firm size are almost unchanged relatively to the ones reported in column (1). In these two specifications, the point estimates for medium and large firms increase slightly relatively to the baseline specification, suggesting that differences across small and large firms in the share of both temporary contracts and unionization, contribute to smaller correlations in the intensity to train and firm size. Also, interestingly, we find that there is a very small but positive correlation between job training on the one hand, and the use of temporary contracts and the share of unionized workers on the other. This finding is supportive of the view that temporary contracts at the firm level could be used as a screening mechanism to access worker quality and productivity (see Autor, 2004). It is also supportive of the view that unions could play a role in helping workers obtain a share of the training benefits (when training is firm specific), and thus avoiding poaching

[30] Most of the literature looking at this topic for developed countries has found that temporary workers receive less job training than permanent workers although the effects are small (see e.g., Bassanini et al, 2005). Almeida and Aterido (2008) tackle a related topic of how training intensity differs with the enforcement of country labor code. They find that reforms in the labor code that simultaneously accelerate the flexibility in hiring (through fewer hiring regulations and more flexible working schedules) and increase the protection of permanent workers tend to generate negative effects on the on the investment in human capital by firms.

problems.[31] Nevertheless, it should be noted that the point estimates for these two variables are very small, suggesting that they have a small explanatory power when comparing incidence across firms operating within the same country, city and detailed sector of activity.[32]

Third, we investigate whether the positive correlation could be driven by SMEs being less profitable or having a lower access to external finance than larger firms. In our data we observe the share of reinvested profits and the access to external finance and see that SMEs have lower shares of reinvested profits and also lower access to finance.[33] Both firm-level and industry-level studies suggest that small firms do relatively better compared to large firms in countries with better-developed financial institutions (see e.g., Beck et al, 2008).[34] The point estimates in column (5) and (6) of table 7 shows that the positive correlations in the intensity to train and the firm size are robust to controlling for these differences across firms. Moreover, we always find a robust positive correlation between incidence of job training on the one hand and the share of reinvested profits and access to external finance on the other. This finding shows that improving the access to finance matters to foster the investment in human capital independently of firm size. Moreover, controlling for these differences in columns (5) and (6) leaves almost unchanged the differences cross small and large firms in the intensity to train reported in column (1).

Finally, we investigate whether SMEs are less likely to invest in job training due to the greater uncertainty on the quality of the investment in job training and thus on the

[31] In theory, the effect of trade unions on job training depends on whether the effect is through the wage structure (where more unionization leads to higher wages and arguable lower investments) or through the direct negotiation of training. Booth et al(2003) and Bassanini et al (2005) discuss this in detail. The empirical work has also found mixed results. Our findings are in line with Lynch and Black, (1998), Green and Lemieux (2007) who find almost no link between unions and the provision of job training.

[32] The surveys also collect information that allow us to compute labor turnover. However, the sample size falls dramatically, invalidating the comparison with a broader sample. As with the share of temporary contracts the evidence is supportive of firms facing higher turnover also investing more.

[33] We measure access to external finance with a dummy variable equal to one when the firm reports financing its working capital with bank loans and overdrafts at commercial banks or with leasing arrangements.

[34] With financial development, small firms grow faster since their financing constraints are relaxed to a greater extent. Furthermore, industrial sectors that naturally should have a disproportionately large number of small firms also grow faster with greater financial development, suggesting that it is the small firms that benefit the most.

returns. If uncertainty is a problem hitting particularly micro and small firms, then these could be less likely to invest in spite of the potentially large ex-post returns. To account for differences across firms in economic uncertainty, we follow Aterido et al (2011) and explore information on how managers rank the importance of the uncertainty in the economic and regulatory policy relatively to other obstacles.[35] Our prior is that for firms reporting that economic uncertainty is more of an obstacle than other factors, they will be less likely to invest in job training. And, because firms differ significantly in the level of perception on how important these different economic factors are, we also control for differences across firms in the a group of indicators (including perceptions regarding the economic and regulatory policy uncertainty, macroeconomic instability, corruption, crime, theft and disorder, anti-competitive or informal practices, legal system/conflict resolution). Column (7) reports the results of this regression. Reassuringly the point estimates remain very similar to the ones reported in column (1). Again this suggests that although facing higher levels of economic uncertainty seems to matters for this investment, this does not disproportionally explain why SMEs train less than larger firms.

A possible concern with the findings in table 7 relates to the potential endogeneity of the explanatory variables in columns (2) through (7). If the investment in job training within the firm leads to higher employment growth as well as to greater access to finance, or to a greater share of reinvested profits, then the point estimates could be biased upwards. We follow Aterido et al (2011) and construct proxies for each of the factors discussed in table 7 but based instead on the responses of the average firm located in the same country, location, sector and size cell (excluding the observation related to the own firm).[36] Matching the mean response for each firm is a two step approach. To illustrate,

[35] The exact question in the *Enterprise Surveys* is "Please tell us if any of the following issues are a problem for the operation and growth of your business. If an issue poses a problem, please judge its severity as an obstacle on a four-point scale: Telecommunications, Electricity, Transportation, Access to Land, Tax rates, Tax administration, Customs and Trade Regulations, Labor Regulations, Skills and Education of Available Workers, Business Licensing and Operating Permits, Access to Financing, Cost of Financing, Economic and Regulatory Policy Uncertainty, Macroeconomic Instability, Corruption, Crime, theft and disorder, Anti-competitive or informal practices, Legal system/conflict resolution. Rankings vary between 1 and 5. Some papers have explored this information to relate levels in perceptions with firm performance (e.g., Ayyagari et al. 2008; Beck et al. 2005; Pierre and Scarpetta 2006).

[36] To ensure adequate numbers of firms in each cell average we drop one dimension of the cell until an adequate number is reached, i.e. first substituting by country-location-size averages, then by country-sector-size averages, etc. Aterido (2011) also explore this approach.

take the information that firms report about access to credit. First, when constructing the mean access to finance at the country-location-sector-size average we use as measure of firm size the firm's *average* size (between period t-3 and t) rather than the current firm size. The latter is arguably more exogenous to the firm's current investment in job training than the former (especially if we worry with reverse causality). Second, we match the averaged indicators to each firm based on the firm *initial* size, not the current size. We estimate the same model as the one reported in table 7 but based on these variables and report the findings in table A5. It is reassuring to see that the relation between the investment in job training and each measure of market imperfection are qualitatively very similar than the ones in table 7. The main differences relate with the lack of statistical significance of one of the variables proxing access to capital (share of reinvested profits) and with the variable proxying the perceived uncertainty of the economic environment. [37]

6. Conclusion and Policy Implications

The importance of the SME sector for growth in the developing world is consensual and policymakers all over the world worry with how to foster productivity and growth among this group of firms. Moreover, in a modern economy, the investment in human capital is crucial to foster technological adoption and, thus, achieve higher productivity growth. This paper explores a unique firm level data set across 99 countries in the developing world to (1) document how different are the propensities to invest in job training across firm sizes; and to (2) investigate the reasons behind the large differences in the investment in job training. We conjecture that SMEs could be less likely to invest in job training because of three broad sets of reasons. First, the expected return on the investment in job training might be smaller for SMEs. This could happen if either SMEs have lower expected benefits or higher marginal costs of the investment in

[37] We have also tested the robustness of our findings by averaging the responses of firms: (1) Considering the current firm size (instead of the initial size); (2) Excluding the size dimension (i.e., computing means by country, sector and location). Reassuringly the results (not reported but available on request) are supportinve of the low explanatory power of the proposed variables in explaining the large training gaps across firm size within countries and sectors. Moreover, the qualitative results for each of the proposed explanatory variables remains very similar to the ones reported in table 7.

job training. Second, SMEs could be more likely to lack the financial resources to invest, in spite of the possibly large expected returns of investing. Third, in spite of possibly large average returns, SMEs could have worse access to information, face greater uncertainty regarding the returns of this investment or have larger coordination problems with their workers than larger firms.

Our findings show that a strong and positive correlation across the investment in job training and firm size is a robust empirical finding within and across countries with different institutions and income levels. However, our data do not support the view that the difference in investment in job training across firm size is mostly explained by market imperfections and institutional failures impeding SME development. Rather, they most likely point to the smaller expected returns from this investment. Therefore, our findings call for some caution when designing pro-SME policies tackling these imperfections with the ultimate objective to abolish this gap. Simply from an efficiency perspective, a pro-SME intervention in this market is not necessarily needed or desirable.

Finally, our findings are supportive of policy interventions improving the general access to information and external finance, the coordination between firms and workers and mitigating the uncertainty in the investment climate producing positive effects on training incidence in the developing world. Moreover, institutional and policy reforms fostering the integration of firms in the global markets and leading to more technological innovations should also foster the investment in job training across all firm sizes. However, we do not find much support that this type of intervention will significantly improve the incentives to invest among SMEs relative to larger firms.

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Table 1. Summary Statistics

	N	Mean	S.D.	Min	Max
Share of Firms Training	48,580	0.396	0.489	0	1
Micro Firms	47,612	0.30	0.46	0	1
Small Firms	47,612	0.37	0.48	0	1
Medium Firms	47,612	0.22	0.41	0	1
Large Firms	47,612	0.11	0.32	0	1
Age of the Firm	46,325	16.5	15.9	1	193
Capital City Dummy	42,653	0.515	0.500	0	1
Public Ownership	47,043	0.054	0.227	0	1
Exporter	47,984	0.246	0.431	0	1
Foreign Ownership	47,269	0.119	0.323	0	1
Technological Innovation	34,478	0.544	0.498	0	1
R&D Intensity	21,067	0.273	0.446	0	1
ISO Technlogical Certification	29,021	0.191	0.393	0	1
Managerial Terciary Education	18,818	0.728	0.445	0	1
Share Skilled Workers	38,743	0.708	0.291	0	1
Av. Years Education Workforce	30,897	7.720	3.401	0	14
High Technology Industries	48,376	0.233	0.423	0	1
Access to Finance	43,703	0.650	0.477	0	1
Capacity Utilization	40,405	72.826	22.079	0	100

Source: Author's calculations are based on the *Enterprise Suveys* (World Bank)

Note: Table reports summary statistics of the main variables in the paper. All the variables are defined in table A2 in the appendix.

Table 2: Descriptive Statistics, by Training Intensity

	Training Firms	Non-Training Firms
Number of Firms	19,260	29,320
Micro	0.15	0.39
Small	0.33	0.40
Medium	0.28	0.14
Large	0.13	0.04
Foreign Ownership	0.18	0.08
Public Ownership	0.09	0.03
Age Firm	18.62	15.06
Share of Skilled Workers	0.68	0.73
Managerial Terciary Education	0.82	0.64
Technology Adoption	0.65	0.45
Investment R&D	0.38	0.18
ISO Technlogical Certification	0.32	0.09
Value added per employee (log)	2.14	1.48

Source: Author's calculations are based on the *Enterprise Suveys* (World Bank)

Note: Table reports characteristics of firms by training intensity. All the variables are definied in Table A.2. in the appendix.

Table 3: Determinants of Size-Job Training Differential: Role of Skills and Technological Complementarities

	(1)	(2)	(3)	(4)
Small Firms	0.171	0.164	0.144	0.136
	[0.0120]***	[0.0103]***	[0.0114]***	[0.0143]***
Medium Firms	0.378	0.359	0.328	0.317
	[0.0198]***	[0.0130]***	[0.0148]***	[0.0184]***
Large Firms	0.498	0.468	0.421	0.412
	[0.0270]***	[0.0137]***	[0.0157]***	[0.0207]***
Openness	-	0.114	0.104	0.0968
		[0.00765]***	[0.00870]***	[0.00905]***
Age of the Firm (Log)	-	0.00377	0.00432	0.00409
		[0.00445]	[0.00499]	[0.00505]
Public Ownership	-	0.006	0.0034	-0.00289
		[0.0167]	[0.0177]	[0.0283]
Share of Skilled Workers	-	0.101	0.0854	0.078
		[0.0138]***	[0.0146]***	[0.0169]***
Technological Innnovation	-	-	0.173	0.172
			[0.00800]***	[0.00963]***
Country Fixed Effects?	Yes	No	No	No
Country-Sector Fixed Effects?	No	Yes	Yes	No
Country -City-Sector Fixed Effects?	No	No	No	Yes
Observations	47,612	35,644	29,644	29,817

Source: Author's calculations are based on the *Enterprise Suveys* (World Bank)

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Dependent variable is a dummy variable that equals 1 when the firm reports providing on the job training. Standard errors are clustered at the country and sector level. Column (1) includes country fixed effects, column (2) includes country and sector interactions and column (4) includes country-sector and city interactions. We consider 3 city categories - capital cities and those with a population above one million, and cities below 1 million people. Column (1) includes size dummies; column (2) includes in addition to the variables in column (1), firm openness, log age of the firm, the share of capital owned by public sources and the share of skilled workers in the firm. Column (3) adds a technological innovation dummy and column (4) replicates column (3) but controlling for country-city-sector dummies. We refer to the specification in column (3) of this table as the baseline specification. All the variables are defined in Table A.2. in the appendix.

Table 4: The Size- Job Training Differential: Heterogenity Within Countries

Sample	Firms Outside Capital City	Firms Manufacturig	Firms Low Tech Manufacturing	Firms High Tech Manufacturing
	(1)	(2)	(3)	(4)
Small Firms	0.138	0.131	0.13	0.124
	[0.0144]***	[0.0188]***	[0.0199]***	[0.0379]***
Medium Firms	0.344	0.326	0.335	0.301
	[0.0185]***	[0.0229]***	[0.0270]***	[0.0389]***
Large Firms	0.462	0.417	0.438	0.372
	[0.0174]***	[0.0222]***	[0.0257]***	[0.0366]***
Baseline Specification?	Yes	Yes	Yes	Yes
Country Fixed Effects?	Yes	Yes	Yes	Yes
Sector Fixed Effects?	Yes	Yes	Yes	Yes
Observations	16,774	17,772	11,665	6,045

Source: Author's calculations are based on the *Enterprise Suveys* (World Bank)

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Dependent variable is a dummy variable that equals 1 when the firm reports providing on the job training. Standard errors are clustered at the country and sector level. Columns (1) through (4) report the results of estimating the baseline specification - reported in column (3) of table 3 - for different samples. Column (1) considers only firms located outside the capital city, column (2) considers only manufacturing firms, column (3) considers only low-tech firms and column (4) considers only high-tech firms All the variables are defined in Table A.2. in the appendix.

Table 5: The Size-Job Training Differential: Heterogenity Around the Developing World

Sample	Africa	East Asia	Eastern Central Europe	Latin America	Middle East and North Africa	South Asia
	(1)	(2)	(3)	(4)	(5)	(6)
Small Firms	0.0987	0.0683	0.202	0.147	0.0996	0.113
	[0.0247]***	[0.0366]*	[0.0236]***	[0.0141]***	[0.0227]***	[0.0208]***
Medium Firms	0.292	0.236	0.325	0.367	0.202	0.268
	[0.0424]***	[0.0392]***	[0.0254]***	[0.0187]***	[0.0415]***	[0.0336]***
Large Firms	0.47	0.321	0.393	0.423	0.458	0.409
	[0.0569]***	[0.0374]***	[0.0290]***	[0.0157]***	[0.0526]***	[0.0447]***
Baseline Specification?	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Sector Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,671	7,317	6,615	8,873	2,192	3,222

Source: Author's calculations are based on the *Enterprise Suveys* (World Bank)

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Dependent variable is a dummy variable that equals 1 when the firm reports providing on the job training. Standard errors are clustered at the country and sector level. Columns (1) through (6) report the results of estimating the baseline specification (column 3 of table 3) for different regional samples. Column (1) includes only firms in Africa, column (2) includes firms in East Asia, column (3) includes firms in Eastern Europe, column (4) includes firms in Latin America, column (5) includes firms in Middle East and North Africa and column (6) includes firms in South Asia. All the variables are defined in Table A.2. in the appendix.

Table 6: Size-Training Premium: Robustness by Income Groups

Sample	Low Income	Middle -Low Income	Middle High Income
	(1)	(2)	(3)
Small Firms	0.128	0.11	0.219
	[0.0180]***	[0.0153]***	[0.0198]***
Medium Firms	0.305	0.293	0.384
	[0.0292]***	[0.0205]***	[0.0194]***
Large Firms	0.432	0.392	0.405
	[0.0353]***	[0.0223]***	[0.0158]***
Baseline Specification?	Yes	Yes	Yes
Country Fixed Effects?	Yes	Yes	Yes
Sector Fixed Effects?	Yes	Yes	Yes
Observations	7,040	17,317	5,287

Source: Author's calculations are based on the *Enterprise Suveys* (World Bank)

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Dependent variable is a dummy variable that equals 1 when the firm reports providing on the job training. Standard errors are clustered at the country and sector level. Columns (1) through (3) report the results of estimating the baseline specification (in column (3) of table 3) for different samples. Column (1) includes only firms in low income countries, column (2) includes only countries in low-middle income countries and column (3) includes only firms in high-middle income countries. All the variables are defined in Table A.2. in the appendix.

Table 7: Determinants of the Size-Job Training Differential: Role of Information, Contracts and Uncertainty

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Small Firms	0.144	0.0831	0.157	0.136	0.148	0.142	0.154
	[0.0114]***	[0.0216]***	[0.0106]***	[0.0119]***	[0.0161]***	[0.0112]***	[0.0113]***
Medium Firms	0.328	0.278	0.345	0.344	0.326	0.327	0.35
	[0.0148]***	[0.0287]***	[0.0134]***	[0.0181]***	[0.0197]***	[0.0146]***	[0.0152]***
Large Firms	0.421	0.352	0.439	0.453	0.411	0.419	0.439
	[0.0157]***	[0.0277]***	[0.0135]***	[0.0187]***	[0.0203]***	[0.0158]***	[0.0153]***
Managerial Terciary Education	-	0.132	-	-	-	-	-
		[0.0151]***					
Share Temporary Contracts	-	-	0.00189	-	-	-	-
			[0.000248]***				
Share Unionized Workers	-	-	-	0.000924	-	-	-
				[0.000255]***			
Share of Profits Reinvested	-	-	-	-	0.000853	-	-
					[0.000131]***		
Access to External Finance	-	-	-	-	-	0.0463	-
						[0.0104]***	
Uncertainty Economic Policy	-	-	-	-	-	-	-0.0328
							[0.0127]***
Baseline Specification?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country - Setctor Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	29,644	12,892	29,644	19,050	18,997	28,677	21,617

Source: Author's calculations are based on the *Enterprise Suveys* (World Bank)

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Dependent variable is a dummy variable that equals 1 when the firm reports providing on the job training. Standard errors are clustered at the country level. Columns (1) reports the baseline specification as in column (3) of table 3. Column (2) through (6) report different robustness based on alternative firm characteristics. In addition to column (1), we have controls for the managerial tertiary education (column 2), share of temporary contracts (column 3), share of unionized workers (column 4), share of profits reinvested (column 5), access to external finance (column 6) and uncertainty on the regulatory environment (column 7). All the variables are defined in Table A.2. in the appendix.

Table A1: Sample Composition and the Provision of Job Training

country	N. obs.	Share Firms Training	Share in Overall Sample	country	N. obs.	Share Firms Training	Share in Overall Sample	country	N. obs.	Share Firms Training	Share in Overall Sample
AFRICA				*EAST EUROPE*				*EAST ASIA*			
Angola2006	329	0.20	0.68	Albania2005	198	0.47	0.41	Cambodia2003	503	0.22	1.04
Benin2004	184	0.35	0.38	Armenia2005	329	0.35	0.68	China2003	3,900	0.73	8.03
Botswana2006	216	0.25	0.44	Azerbaijan2005	290	0.16	0.6	Indonesia2003	596	0.24	1.23
BurkinaFaso2006	51	0.43	0.10	Belarus2008	84	0.38	0.17	Laos2005	245	0.28	0.5
Burundi2006	238	0.13	0.49	BiH2005	180	0.46	0.37	Malaysia2002	897	0.42	1.85
Cameroon2006	118	0.42	0.24	Bulgaria2005	279	0.32	0.57	Mongolia2004	195	0.47	0.4
CapeVerde2006	47	0.43	0.10	Croatia2005	207	0.58	0.43	Philippines2003	667	0.22	1.37
DRC2006	253	0.09	0.52	Czech2005	262	0.6	0.54	Thailand2004	1,385	0.76	2.85
Ethiopia2002	412	0.22	0.85	Estonia2005	191	0.63	0.39	Vietnam2005	1,642	0.55	3.38
Gambia2006	159	0.14	0.33	FYROM2005	174	0.37	0.36	**TOTAL EA**	**10,030**		**20.7**
Ghana2007	616	0.27	1.27	Georgia2008	118	0.14	0.24				
Guinea2006	239	0.15	0.490	Hungary2005	559	0.39	1.15	*LATIN AMERICA*			
GuineaBissau2006	149	0.08	0.310	Kazakhstan2005	559	0.29	1.15	Argentina2006	650	0.48	1.34
Kenya2007	520	0.31	1.070	Kyrgyzstan2005	185	0.47	0.38	Bolivia2006	365	0.57	0.75
Lesotho2003	69	0.25	0.140	Latvia2005	178	0.52	0.37	Brazil2003	1,639	0.67	3.37
Madagascar2005	293	0.48	0.600	Lithuania2005	175	0.49	0.36	Chile2004	945	0.72	1.95
Malawi2005	155	0.50	0.320	Moldova2005	335	0.33	0.69	Colombia2006	633	0.5	1.3
Mali2007	619	0.16	1.270	Montenegro2003	100	0.31	0.21	CostaRica2005	343	0.46	0.71
Mauritania2006	204	0.14	0.420	Poland2005	937	0.48	1.93	Dom.Rep.2005	225	0.53	0.46
Mauritius2005	197	0.62	0.41	Romania2005	582	0.32	1.2	Ecuador2006	362	0.66	0.75
Mozambique2007	599	0.18	1.23	Russia2005	539	0.36	1.11	ElSalvador2003	465	0.5	0.96
Namibia2006	205	0.28	0.42	Serbia&Mont2005	259	0.46	0.53	Guatemala2003	455	0.54	0.94
Niger2005	125	0.34	0.26	Slovakia2005	194	0.79	0.4	Guyana2004	154	0.34	0.32
Nigeria2007	1,444	0.22	2.97	Tajikistan2008	116	0.23	0.24	Honduras2003	450	0.54	0.93
Rwanda2006	187	0.09	0.38	Turkey2008	851	0.39	1.75	Jamaica2005	89	0.62	0.18
Senegal2007	626	0.15	1.29	Ukraine2008	480	0.29	0.99	Mexico2006	1,118	0.32	2.3
SouthAfrica2007	1,057	0.41	2.18	Uzbekistan2008	121	0.23	0.25	Nicaragua2003	452	0.41	0.93
Swaziland2006	192	0.30	0.4	**TOAL EE**	**8,482**		**17.47**	Panama2006	239	0.42	0.49
Tanzania2006	338	0.33	0.7	*MIDDLE EAST*				Paraguay2006	380	0.46	0.78
Uganda2006	405	0.28	0.83	Algeria2002	537	0.32	1.11	Peru2002	575	0.54	1.18
Zambia2007	603	0.19	1.24	Egypt2004	975	0.12	2.01	Uruguay2006	360	0.35	0.74
TOTAL AFR	**10,849**		**22.33**	Jordan2006	351	0.24	0.72	Venezuela2006	494	0.49	1.02
SOUTH ASIA				Lebanon2006	354	0.68	0.73	**Total LAC**	**10,393**		**21.4**
Bangladesh2002	965	0.27	1.99	Morocco2004	846	0.19	1.74				
India2006	2,154	0.16	4.43	Oman2003	325	0.21	0.67				
Pakistan2002	965	0.11	1.99	Syria2003	527	0.22	1.08				
SriLanka2004	427	0.33	0.88	WBankGaza2006	400	0.26	0.82				
TOTAL SA	**4,511**		**9.29**	**TOTAL ME**	**4,315**		**8.88**	**TOTAL**	**48,580**		**100**

Source: Author's calculation based on *Enterprise Surveys*

Note: Table reports the sample composition for each country and the mean training intensity

Table A.2. Variables Definitions

Variable	Definition
Training	Dummy variable equal to 1 if the firm provides internal or external training to its workers.
Micro Firms	Dummy variable equal to 1 if the firm has less than 11 employees
Small Firms	Dummy variable equal to 1 if the firm has between 11 and 50 employees
Medium Firms	Dummy variable equal to 1 if the firm has between 51 and 250 employees
Large Firms	Dummy variable equal to 1 if the firm has more than 250 employees
Age of the Firm	Year of the survey minus the year when the firm started operations.
Capital City Dummy	Dummy variable equal to 1 if the firm is located in the country's capital city
Public Ownership	Dummy variable equal to 1 if 10% or more of the firm's capital owned by the government
Exporter	Dummy variable equal to 1 if the firm exports directly or indirectly 10% or more.
Foreign Ownership	Dummy variable equal to 1 if 10% or more firm's capital is owned by foreigners.
Openness	Dummy variable equal to 1 if the firm exports more than 10% of its sales or has more than 10% of foreign capital.
Technological Innovation	Dummy variable equal to 1 if the firm introduced a new technology that substantially changed the way the main product was produced in the three years prior to the survey.
ISO Technlogical Certification	Dummy if the firm has an ISO certification.
Managerial Terciary Education	Dummy variable equal to 1 if the manager has tertiary education
Share Skilled Workers	Firm's workforce that are managers, professionals, skilled production and non-production workers as a percentage of skilled and unskilled production
R&D Intensity	Dummy variable equal to 1 if the firm has design and R&D expenditures (e.g., labor costs with R&D personnel, materials or subcontracting costs).
High Technology Industries	Auto and auto-components, chemicals and pharmaceuticals, electronics, and metals and machinery.
Low-Technology Industries	Beverages, food, garments, leather, non-metallic and plastic materials, paper, other manufacturing, textiles, and wood and furniture. These definitions follow Parisi et al. (2006).
Access to Finance	Dummy variable equal to 1 if a firm finances its investments through commercial banks or leasing arrangements.
Capacity Utilization	Percentage of firm's capacity being used in production
Value Added per employee (log)	Sales minus inputs divided by total number of workers (in 2005 USD)
Mean Wages (log)	Annual wage compensation divided by total number of workers (in 2005 USD)
Mean Training in Coutry-City -Sector	Share of firms in the coutry, 3-digit sector and city (capital city; city with more than 1 mln ind.; city with 250k-1mln ind.; city with 50k-250k ind.; city with less than 50k ind. and a dummy for unknown city dimension) that offer formal training programs.
Unionization	Dummy variable equal to 1 if more than 50% of the workforce in the firm is unionized.
Share Females Workforce	Share of female workers in the workforce
Av. Years of Education	Average years of schooling of the workforce.

Source: Enterprise Surveys (World Bank).

Table A.3. Characteristics of Firms with Missing Training Information

	(1)	(2)	(3)
Small Firms	-0.0273	-0.0318	-0.015
	[0.00325]***	[0.00374]***	[0.00332]***
Medium Firms	-0.0293	-0.0342	-0.0168
	[0.00246]***	[0.00261]***	[0.00204]***
Large Firms	-0.0275	-0.0308	-0.0142
	[0.00229]***	[0.00228]***	[0.00206]***
Openness	0.00165	0.00125	-0.00303
	[0.00366]	[0.00413]	[0.00244]
Age of the Firm (Log)	-0.0012	-0.00155	-0.000119
	[0.00200]	[0.00227]	[0.00100]
Public Ownership	-0.00566	-0.00706	-0.00562
	[0.00569]	[0.00622]	[0.00260]**
Share of Skilled Workers	0.0221	0.0277	0.0142
	[0.00897]**	[0.0112]**	[0.00964]
Technological Innnovation	-	0.00682	0.00131
		[0.00363]*	[0.00178]
Country-Sector Fixed Effects?	Yes	Yes	No
Country -City-Sector Fixed Effects?	No	No	Yes
Observations	14,900	12,530	18,462

Source: Author's calculations are based on the *Enterprise Suveys* (World Bank)

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Dependent variable is a dummy variable that equals 1 when the firm reports providing on the job training. Standard errors are clustered at the country level. We refer to the specification in column (3) of this table as the baseline specification. All the variables are definied in Table A.2. in the appendix.

Table A4: Determinants of the Size-Job Training Differential: Robustness Firm Characteristics

	(1)	(2)	(3)	(4)	(5)
Small Firms	0.148	0.151	0.155	0.145	0.15
	[0.0128]***	[0.0170]***	[0.0145]***	[0.0112]***	[0.0133]***
Medium Firms	0.331	0.317	0.325	0.332	0.364
	[0.0159]***	[0.0220]***	[0.0181]***	[0.0149]***	[0.0181]***
Large Firms	0.418	0.412	0.395	0.429	0.474
	[0.0172]***	[0.0238]***	[0.0190]***	[0.0158]***	[0.0182]***
Av. Education of the Workforce	0.0265	-	-	-	-
	[0.00754]***				
Investment R&D	-	0.191	-	-	-
		[0.0146]***			
ISO certification	-	-	0.228	-	-
			[0.0139]***		
Capacity Utilization	-	-	-	0.00231	-
				[0.000862]***	
Capital-Labor Ratio					0.0119
					[0.00309]***
Baseline Specification?	Yes	Yes	Yes	Yes	Yes
Country-Sector Fixed Effects?	Yes	Yes	Yes	Yes	Yes
Observations	23,458	17,003	23,178	28,183	22,574

Source: Author's calculations are based on the *Enterprise Suveys* (World Bank)

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Dependent variable is a dummy variable that equals 1 when the firm reports providing on the job training. Standard errors are clustered at the country and sector level. Columns (1) through (5) report different specifications. In addition to the baseline specification (in column 3 of table 3) we include av. education of the workforce (captured by years of schooling) (column 1), Investment in R&D (column 2), ISO certification (column 3), capacity utilization (column 4). All the variables are defined in Table A.2. in the appendix.

Table A5: Robustness on Determinants of the Size-Job Training Differential: Mean Explanatory Variables

	(1)	(2)	(3)	(4)	(5)	(6)
Small Firms	0.0638	0.151	0.125	0.144	0.139	0.154
	[0.0208]***	[0.0110]***	[0.0131]***	[0.0149]***	[0.0121]***	[0.0115]***
Medium Firms	0.234	0.337	0.317	0.322	0.318	0.343
	[0.0309]***	[0.0140]***	[0.0213]***	[0.0183]***	[0.0162]***	[0.0155]***
Large Firms	0.309	0.432	0.409	0.411	0.411	0.436
	[0.0331]***	[0.0142]***	[0.0254]***	[0.0186]***	[0.0174]***	[0.0157]***
Mean Managerial Terciary Education	0.299	-	-	-	-	-
	[0.0668]***					
Mean Share Temporary Contracts	-	0.00176	-	-	-	-
		[0.000706]**				
Mean Share Unionized Workers	-	-	0.00105	-	-	-
			[0.000545]*			
Mean Share of Profits Reinvested	-	-	-	0.000838	-	-
				[0.000558]		
Mean Access to External Finance	-	-	-	-	0.0819	-
					[0.0428]*	-0.0647
Mean Uncertainty Economic Policy	-	-	-	-	-	[0.0519]
Baseline Specification?	Yes	Yes	Yes	Yes	Yes	Yes
Country - Setctor Fixed Effects?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,932	29,511	22,768	23,238	29,503	23,391

Source: Author's calculations are based on the *Enterprise Suveys* (World Bank)

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Dependent variable is a dummy variable that equals 1 when the firm reports providing on the job training. Standard errors are clustered at the country and 3-digit sector level. Column (1) through (6) report alternative specifictions of columns (2) through (6) of table 7 but computing the LHS variables with withs of firms located in the same country-sector-location-size bin. Column (1) controls for the share of firms with managerial tertiary education, Column (2) for the mean share of temporary contracts, column (3) for the mean share of unionized workers, column (4) for the mean share of reinvested profits, column (5) for the share of firms with access to external finance and column (6) for the share of firms reporting uncertainty on the regulatory environment a high constraint to growth. The construction of these variables follows Aterido et al (2011) and details are given in the text.

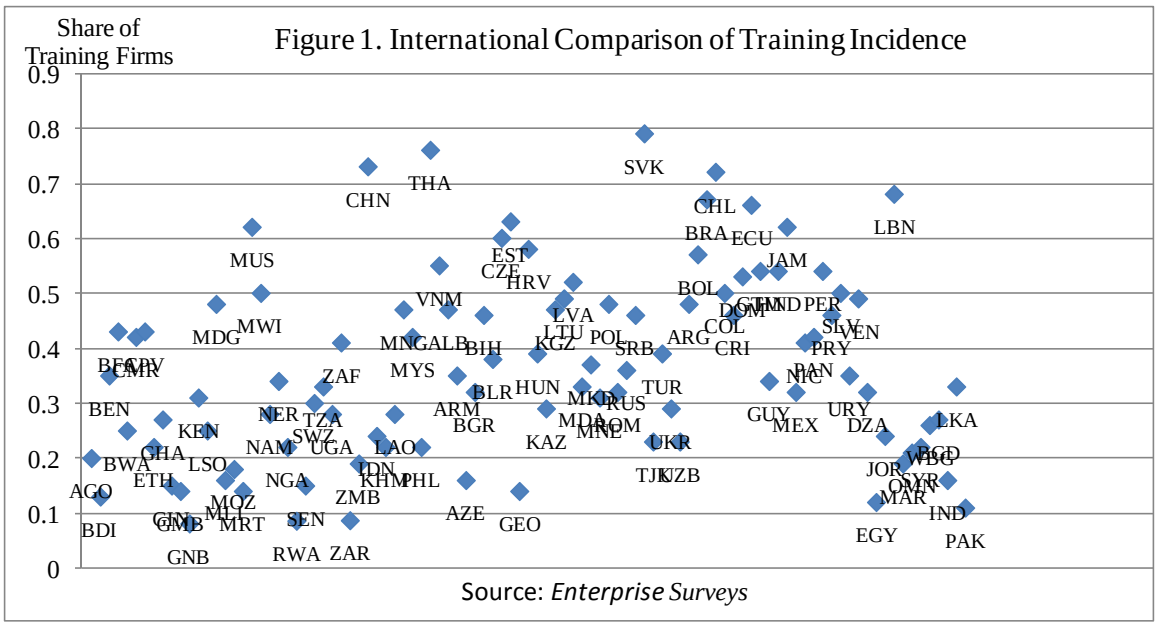
Share of Training Firms
Figure 1. International Comparison of Training Incidence
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
SVK
CHN
THA
CHL
LBN
BRA
ECU
MUS
EST
JAM
CZE
HRV
BOL
VNM
LVA
PER
MDG
MWI
COL
SLV
VEN
MNG
ALB
BIH
KGZ
POL
ARG
CRI
SRB
PRY
ZAF
MYS
PAN
NIC
BLR
HUN
TUR
BEN
ARM
RUS
GUY
MEX
URY
DZA
LKA
NER
TZA
KEN
BGR
KAZ
UKR
SWZ
NAM
UGA
LAO
BWA
LSO
IDN
NGA
ZMB
AZE
GEO
AGO
ETH
MOZ
MRT
SEN
BDI
GNB
RWA
ZAR
EGY
IND
PAK
Source: *Enterprise Surveys*


Figure 2. Reasons for Not Training in Brazil, by Firm Size
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
All
Small
Medium
Large
Informal Training
Poaching
Lack Financing
High Turnover
Lack Knowledge
No Need Train
Skepticism
Enterprise Surveys
(small 1-49; medium 50-99; large 100+)

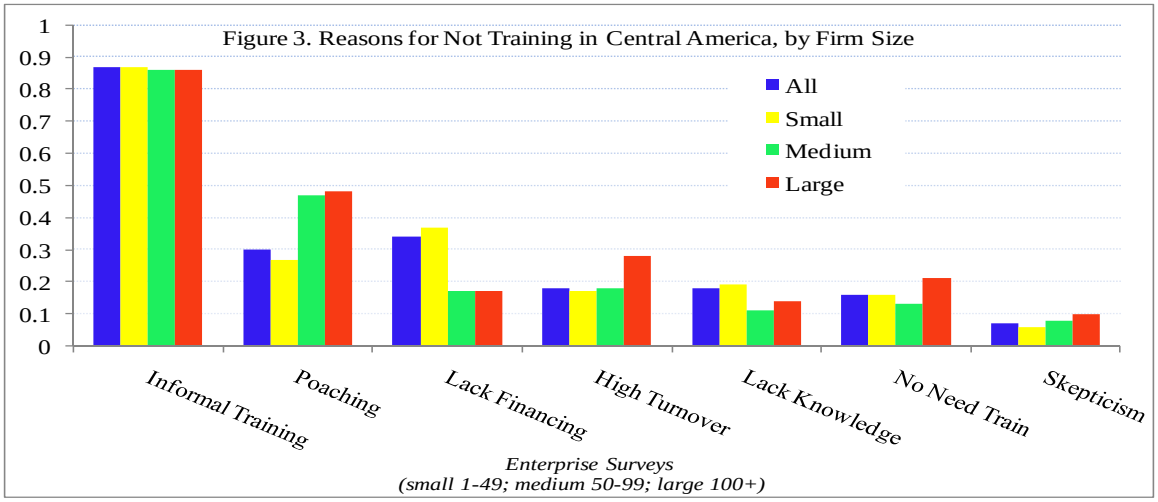
Figure 3. Reasons for Not Training in Central America, by Firm Size
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
All
Small
Medium
Large
Informal Training
Poaching
Lack Financing
High Turnover
Lack Knowledge
No Need Train
Skepticism
Enterprise Surveys
(small 1-49; medium 50-99; large 100+)

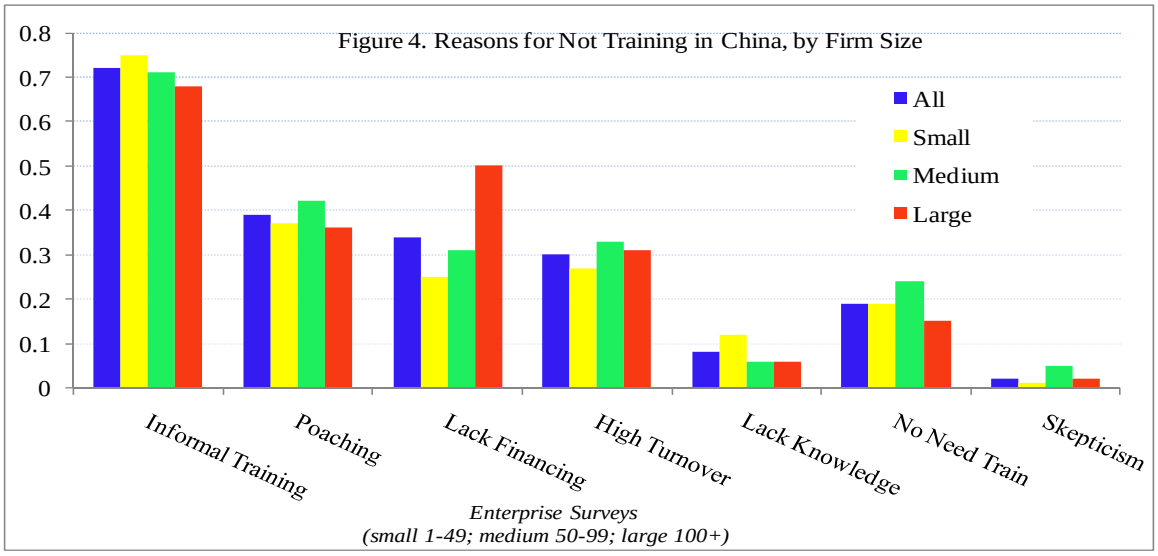
Figure 4. Reasons for Not Training in China, by Firm Size
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
All
Small
Medium
Large
Informal Training
Poaching
Lack Financing
High Turnover
Lack Knowledge
No Need Train
Skepticism
Enterprise Surveys
(small 1-49; medium 50-99; large 100+)